

**AIR MECHANIC Certificates and AIR ENGINEERS' Licenses – as should have been written and now reflecting "Current" terminology** – ( NOTE this is an ongoing W.I.P as more factual information is obtained related to the training and licensing of Aeronautical Ground Engineers / Air Engineers - Steve Chamberlain 2018)

Conditions of issue and Instructions to applicants

**a) DEFINITIONS**

- (a) "Minister," in these instructions, means the Minister of Transport.
- (b) "Air Engineer," in these instructions, means a person who is the holder of an Air Engineer's Certificate issued by the Minister of Transport authorizing him to act as therein specified.
- (c) "Air Mechanic," in these instructions, means a person who is the holder of an Aircraft Mechanics Certificate of Competency issued by a Provincial Trades' certification Board in meeting the requirements as laid down by the Minister of Transport authorizing him to act as therein specified.

**b) Air Engineer License Categories**

Air Engineers' Certificates will be issued subject to the provisions of Air Regulations, for any or all of the following purposes:

- A. Inspection of aircraft before flight.
- B. Inspection of aircraft after overhaul.
- C. Inspection of aero engines before flight.
- D. Inspection of aero engines after overhaul.

**c) Air Mechanic Categories**

Air Mechanic Certificates of Competency to perform the work in their trade will be issued, subject to the provisions of the Air Regulations, by Provincial Trades certifying boards for accomplishing the work required during routine maintenance, overhaul, modification and manufacture related to the:

- (a) Airframe repair / modification / maintenance
  - (b) Aero-engine repair / modification / maintenance
  - (c) Airframe & Engine repair / modification / maintenance
  - (d) Electrical, Radio, Compass repair / modification / maintenance
- performed that renders the aircraft or engine ready for inspection in order to either
- 1. receive an initial airworthiness certificate, or
  - 2. re-activate an existing airworthiness certificate

**d) QUALIFICATIONS Required to hold an Air Mechanic's Certificate of Competency**

In order to qualify for an **Air Mechanic's Certificate of Competency**, a candidate must,

- (a) Not be under 16 years of age.
- (b) Satisfy the Minister by examination or otherwise as to his ability.
- (c) Be able to demonstrate sufficient ability in the use of appropriate tools and materials that would be necessary to enable him to perform such repairs and replacements as his duties in maintenance of aircraft and/or aircraft engines might require.
- (d) Furnish the names and addresses of 3:
  - a) employers engaged in the manufacture, modification or repair of aircraft and/or aircraft engines; or engaged in the operation of aircraft, OR
  - b) licensed air engineerswho can, from direct personal knowledge, vouch for the proficiency of the candidate in:
  - a) the quality of their workmanship,
  - b) their ability to correctly perform the tasks required,
  - c) their character.

**e) QUALIFICATIONS Required to hold an Air Engineer's License**

In order to qualify for an Air Engineer's Certificate, a candidate must,

- (a) Hold an Air Mechanic's trade certificate of competency
- (b) Be able to demonstrate sufficient ability in the use of appropriate tools and materials that would be necessary to enable him to perform such repairs and replacements as their duties in maintenance of aircraft and/or aircraft engines for their private employer **might** require.
- (c) Be a Canadian Citizen, or a subject of a foreign country which grants reciprocal aeronautical privileges to Canadians on equal terms and conditions with subjects of such foreign country.
- (d) Not be under 21 years of age.
- (e) Satisfy the Minister by examination (or otherwise) as to their knowledge and ability as an delegated inspector – certifier of aircraft maintenance, repair, overhaul modification and/or manufacture on behalf of the Government of Canada.
- (f) Be able to demonstrate sufficient ability in:
  - a) Selecting and understanding the correct legislative documentation (known as a regulatory "technical instrument") applicable to the aircraft / engine / component being built / maintained / repaired / modified in order to ensure correct certification of said item
  - b) their use of regulatory, manufacturer or other approved design documents that would enable them to perform inspection and certification of such repairs and replacements as their administrative duties on behalf of the Government of Canada in the certification of the maintenance of aircraft and/or aircraft engines owned / operated by their private employer **might** require.
- (g) Furnish the names and addresses of three (3):
  - a) **employers** engaged in the manufacture, modification or repair of aircraft and/or aircraft engines; or engaged in the operation of aircraft, and
  - b) **licensed air engineers**who can, from personal knowledge, vouch for the proficiency of the candidate in:
  - d) their quality of work,
  - e) their attention to detail,
  - f) their character,
  - g) Their aptitude in aviation safety.

**f) EXPERIENCE required by Air Mechanic Candidates**

Candidates for Provincial Air Mechanic certificates of competency are required to submit proof of having completed either a combination of or all of:

1. a 3 years' apprenticeship in the foundation Trade of Aircraft Mechanic performing a combination of maintenance, repair, modification and overhaul tasks.
2. a 1 years' apprenticeship **extension** in the Trade of Aero-Engine Mechanic performing a combination of maintenance, repair, modification and overhaul tasks.
3. a 1 years' apprenticeship **extension** in the Trade of Aircraft Mechanic – Electrical, radio and compass performing a combination of maintenance, repair, modification and overhaul tasks.

In all categories, the Certificates of Competency issued will be limited to the specific areas in which the candidate has apprenticed and gained experience.

**g) EXPERIENCE required by Air Engineer Candidates**

- (a) Candidates for certificates in category "A" will be required to submit proof of having had at least two years' satisfactory experience as an apprentice/candidate Inspecting / Certifying engineer on both aircraft construction and maintenance, or on maintenance alone.
- (b) Candidates for certificates in category "B" will be required to submit proof of having had at least two years' satisfactory experience as an apprentice Inspecting / Certifying engineer on aircraft construction and maintenance, or on construction alone.
- (c) Candidates for certificates in category "C" will be required to submit proof of having had at least two years' satisfactory experience as an apprentice Inspecting / Certifying engineer on aero engine construction and maintenance, or on maintenance alone.
- (d) Candidates for certificates in category "D" will be required to submit proof of having had at least four years' satisfactory experience as an apprentice Inspecting / Certifying engineer on aero engine construction and maintenance, or on construction alone.

In all Air Mechanic and Air Engineer categories, the Certificates and/or Licenses issued will be limited to those types of aircraft / engines of which the candidate direct personal experience.

**h) SCHOOL TRAINING – Theory & Practical - Air Mechanic Candidates**

**(a)** Graduation from High school with a minimum 70% pass mark in the following subjects (Theory and Practice) is required as entry level foundation into College level

**technician / mechanic programs:**

- a) English comprehension
- b) Mathematics
- c) Chemistry
- d) Visual Arts (Drawing / painting)
- e) Physics
- f) Drafting & Blueprint
- g) Machine shop
- h) Automotive shop
- i) Wood shop
- j) Paint Shop
- k) Electrical Shop

**(b)** Graduation from a Canadian College education program (or like institution) in Aircraft Maintenance with a minimum 70% pass mark in the following subjects (Theory and Practice) is required to obtain an aircraft mechanics' certificate of competency :

- a) Drafting & Blueprint
- b) Machine shop
- c) Automotive / engine shop
- d) Wood shop
- e) Paint Shop
- f) Electrical Shop

**1. High School education and Practice may be permitted to count towards the experience required for an Air Mechanic's Certificate of Competency under the following conditions:-**

(c) A student having completed a TC accredited 2 year Aircraft Apprentice's course at a Canadian High School may, on graduation from the school, be credited with "hours spent" in the aircraft and aero engine shops of the school performing "practical trades work" towards an Air Mechanics' certificate. Such time may not exceed a credit of one-half year.

(d) A certificate of competency relative to the candidate's qualifications will only be accepted from a licensed engineer in the employ of such school and the hours of practical shop work must be verified by the principal of the school or his assistant.

**2. College level theoretical education and practice in aircraft maintenance may be permitted to count towards the experience required for an Air Mechanic's Certificate of Competency under the following conditions:-**

(e) A student having completed a TC accredited 2 year Air Mechanic's course at a Canadian College may, on graduation from the school, be credited with the actual hours spent in the aircraft and aero engine shops of the school performing "practical trades work" towards their Air Mechanics' certificate. Such time may not exceed a credit of one year.

- (f) A certificate of competency relative to the candidate Air Mechanic's qualifications, abilities and skill to perform work will only be accepted from a licensed engineer in the employ of such school and the hours of practical shop work must be verified by the principal of the school or his assistant.
  
- (g) The balance of the four (4) years' apprenticeship experience required for an **Air** Mechanic's Certificate must be completed in full while performing maintenance, repair, overhaul and/or modification tasks on aircraft / engines / components under the direct supervision of a licensed air engineer.

**i) SCHOOL TRAINING – Theory & Practical - Air Engineer Candidates**

**(a) Time spent at Aircraft maintenance Colleges or like institutions:**

- a. **may** be taken under consideration when assessing the candidate's practical experience in the performance of maintenance, and
- b. **may** be permitted to count towards the experience required for accomplishing supervision / inspection / certification of maintenance required for an Air Engineer's Certificate under the following conditions:-
  - a) A student having completed a distinct Air Engineer's course at a technical school or like institution may, on graduation from the school, be credited with the actual hours spent in the aircraft and aero engine shops of the school acting in a supervisory / inspecting capacity over aircraft maintenance technician students at the same school. Such time may not exceed a credit of one year and will only apply to "Line Maintenance" licenses only.
  - b) A certificate of competency relative to the candidate's work and qualifications as an inspector/certifier will be accepted from a licensed engineer in the employ of such school as course director and the hours of practical inspection and supervisory work in the shop must be verified by the principal or his assistant.
  - c) The balance of the candidates' two years' inspection / certification apprentice experience required for issue of an **Air Engineer's Certificate** must be completed **in full** while performing inspection and certification tasks for their employer under the direct supervision of a licensed air engineer, and must be verified by the Quality / Airworthiness manager or his delegate.
  - d) No part of any high School or College "work" as an inspector / certifier will be admitted as qualifying a candidate Air Engineer for a license to certify work performed during "Heavy" or "Base" Maintenance.

**(b) Time spent at Canadian Universities or like institutions:**

- c. **WILL NOT be taken under consideration when assessing the candidate's practical experience in the performance of aircraft maintenance,** and
- d. **May** only be permitted to count towards the experience required for accomplishing supervision / inspection / certification of maintenance required for an Air Engineer's Certificate under the following conditions:
  - a) A student having completed a distinct Air Engineer's 3 year course at a Canadian University or like institution may, on graduation from the school, be credited with the actual hours spent in the aircraft and aero engine shops of the school acting in a direct supervisory / inspecting capacity over aircraft Maintenance students at an affiliated aircraft maintenance school. Such time may not exceed a credit of one year.
  - b) A certificate of competency relative to the candidate's work and qualifications as an inspector / certifier will be accepted from a licensed

Professional engineer holding an Air Engineer's certificate in the employ of such school as course director and the hours of practical inspection and supervisory work spent in the aircraft maintenance schools' shop must be verified by the principal or his assistant.

- c) The balance of the candidates' two years' inspection / certification apprentice experience required for issue of an **Air Engineer's Certificate** must be completed **in full** performing inspection and certification tasks for their employer under the supervision of a licensed air engineer, and must be verified by the Quality / Airworthiness manager or his assistant.
  - d) While the "Theoretical knowledge" delivered by the institution in engineer foundation and inspection / certification is accredited, No part of any school "work" as an inspector / certifier will be admitted as qualifying a candidate Air Engineer for a license to certify "Theyavy" or "Base" maintenance. All work related to the inspection / certification of "Theyavy" or "Base" maintenance must be accomplished during a supervised apprenticeship in this role for the candidates' employer.
- (c) Graduation from distinct "Air Mechanic's" education program delivered by a Canadian College or like institution with a minimum 70% pass mark in the following subjects (Theory and Practice) **Is required for certification as an "Air Engineer"**:
- a) **English comprehension**
  - b) **Mathematics**
  - c) **Chemistry**
  - d) **Visual Arts (Drawing / painting)**
  - e) **Physics**
  - f) **Drafting & Blueprint**
  - g) **Machine shop**
  - h) **Automotive shop**
  - i) **Wood shop**
  - j) **Paint Shop**
  - k) **Electrical Shop**
- (d)
- (e) Graduation from distinct "Air Engineer's" education program delivered by a Canadian University, College or like institution with a minimum 70% pass mark in the following subjects (Theory and Practice) **Is required for certification as an "Air Engineer"**:
- a) **English comprehension**
  - b) **Mathematics**
  - c) **Chemistry**
  - d) **Visual Arts (Drawing / painting)**
  - e) **Physics**
  - f) **Drafting & Blueprint**
  - g) **Machine shop**
  - h) **Automotive shop**
  - i) **Wood shop**
  - j) **Paint Shop**
  - k) **Electrical Shop**



**j) APPLICATIONS for Air Mechanics' CERTIFICATES of Competency**

- (a) Application forms may be obtained on request from:
  - a) Civil Aviation Inspectors at the various District offices, or from
  - b) the Civil Aviation Division, Department of Transport, Ottawa.
- (b) Applications for Certificates cannot be considered unless sufficient information is given in either the application or letters of competency concerning the candidate's experience on different makes and models of aircraft and aero engines.
- (c) For Mechanic's A or C license applicants, complete details of the applicant are required, both in the application and letters of competency provided in support of their abilities as a repair technician:
  - a) stipulating the length of time connected with the aircraft industry on maintenance duties,
  - b) specifying the makes and models on which satisfactory work has been done.
- (d) For Mechanic's B or D license applicants, complete details of the applicant are required, both in the application and letters of competency provided in support of their abilities as a repair technician:
  - a) stipulating the length of time connected with the aircraft industry on Construction/ Modification / Overhaul duties,
  - b) specifying the makes and models on which satisfactory work has been done.
- (e) **Completed Air Mechanic's trade certificate applications are sent by the applicant to the Provincial Trade Board apprenticeship office which will schedule their testing. Upon satisfactory completion of the Provincial Trade's written, oral and practical tests the Provincial Trades Board will issue a mechanic's certificate of competency to the applicant.**

- k) Air Mechanics wishing to upgrade their trade credentials may, from time to time after obtaining the required theoretical education and practical experience, request to be examined by their Provincial Trades Board on additional types of maintenance / repair work, and if the examinations are satisfactorily passed, their Certificate will be endorsed accordingly. Such examinations may be either oral, practical, written, or all of the above, dependent upon the qualification sought.
- l) When queries arise as to the Competency of an Air Mechanic's skills / abilities / capabilities they may be required to be re-tested by their Provincial / Territorial Trades' Board, or by the Trades Board having oversight of trades-persons within the Province or Territory in which they are working. Failure of these tests will result in suspension of their Air Mechanic's certificate of competency until such time as they successfully pass the test(s) they failed to master.

**m) APPLICATIONS FOR Air Engineers' Licenses**

- (a)** Application forms may be obtained on request from
  - a)** Civil Aviation Inspectors at the various District offices, or from
  - b)** the Civil Aviation Division, Department of Transport, Ottawa.
- (b)** Applications for Air Engineer Licenses cannot be considered unless sufficient information is given in either the application or letters of competency concerning the candidate's knowledge and experience accomplishing inspection / certification work on different makes and models of aircraft, aero engines and accessories.
- (c)** For an A or C license applicant, complete details of the applicant are required, both in the application and letters of competency as inspector / certifier:
  - a)** stipulating the length of time connected with the aircraft industry on maintenance duties,
  - b)** specifying the makes and models on which satisfactory work has been done.
- (d)** For a B or D license applicant, complete details of the applicant are required, both in the application and letters of competency as inspector / certifier:
  - a)** stipulating the length of time connected with the aircraft industry on Construction/ Modification / Overhaul duties,
  - b)** specifying the makes and models on which satisfactory work has been done.
- (e) Completed Applications are sent to:**
  - a)** Civil Aviation Inspectors at the various District offices, or from
  - b)** the Civil Aviation Division, Department of Transport, Ottawa

- n)** Air Engineers may, from time to time, request to be examined on additional airframe and/or engine types, and if the examination is satisfactorily passed, their License will be endorsed accordingly. Such examinations may be either oral, practical, written, or all of the above, dependent upon the qualification sought.
- o)** When queries arise as to the Competency of an Air Engineer's skills / abilities / capabilities as an inspector / certifier they may be required to be re-tested to determine their competency as such. Failure of these tests will result in suspension of their Air Engineer's License until such time as they successfully pass the test(s) they failed to master.

**p) Air Mechanic Qualifying Examinations - Theoretical**

**(a) Category "A" : Daily Inspection of Aircraft / airframes before flight**

Applicants must be familiar with the general principles of the systematic maintenance and examination of aircraft before flight, including knowledge of:

1. The correct assembly of components, the erection of an aircraft, the rigging of an aircraft, the functioning of the flying controls, together with the correction of faults experienced during flight, the correct assembly and functioning of the landing gear including the correct rigging of skis, and the method of erection, truing up and maintenance of hulls and floats of wood, metal, or composite construction.
2. The defects and deterioration in wing coverings, timber and metal members, metal fittings, airscrews (wood or metal), streamline wires, tie-rods, cables, shock absorbing devices and the parts of the aircraft structure that may be expected to occur as the result of wear and tear, or may be produced by slight mishaps experienced during normal operations of the aircraft, and a knowledge of the method of effecting minor repairs and replacements.
3. The method of inspecting and testing the installation of the flying instruments to ensure correct functioning.
4. Compass adjustment, turn indicator, and electrical services, the method of inspecting and testing of the installation concerned in order to ensure correct functioning.
5. All applicable modifications contained in Technical Information Circulars issued by the Controller of Civil Aviation.
6. The entries which must be made in the appropriate log book, and ability to select data and to make the suitable entries to provide a useful history of the aircraft.
7. Air Regulations in so far as they affect Air Engineers.

**(b) Category "B"- Inspection of Aircraft/ airframes after Overhaul, Major Repair, Major Modification.**

The applicant must be familiar with the general principles of the inspection of aircraft construction. including knowledge of:

1. Non-Metallic materials and their relative specifications;
2. methods of identification, examination and testing;
3. characteristic defects which render them unsuitable and precautions to be observed in their application to aircraft construction.
4. Metallic materials and their relative specifications, methods of identification, examination and testing; characteristic defects which render them unsuitable and precautions to be observed during processes of manufacture or repair-(heat treatment, welding, brazing, soldering, plating, etc.).
5. The method of construction and examination of hulls and floats; effects of corrosion, causes of corrosion and protection against corrosion.
6. The method of construction, examination and testing of aircraft parts and components-(fuselages, wings, airscrews, tanks, radiators, pumps, cocks, etc.) corrosion and its prevention. The high tensile steels, strong aluminum alloys, etc., and the special workshop processes applicable to the materials used in the particular construction or constructions.

7. Method of inspecting and testing the complete aircraft for correct assembly, installation of engine, controls, fuel, oil and water systems, cabin heaters, instruments, electrical services and the appliances.
8. All applicable modifications contained in Technical Information Circulars issued by the Controller of Civil Aviation.
9. The entries which must be made in the appropriate log book, and ability to select data and to make the suitable entries to provide a useful history of the aircraft.
10. Air Regulations in so far as they affect Air Engineers.

(c) **Category "C": Daily Inspection of Aero Engines before flight**

The applicant must be familiar with the general principles of inspection and testing of aero engine installation and maintenance, including knowledge of:-

1. The general construction of the particular type or types of engine for which the Certificate is required, together with the running time permissible before overhaul; the method and details of making a partial overhaul for the purpose of carbon removal, valve grinding and inspection, the defects likely to be encountered and the permissible allowances for wear and distortion; the methods of inspection and testing during and after this operation to ensure correct assembly and functioning.
2. The methods of examining and testing the correct erection of the power plant and its accessories in the aircraft, including the fuel, oil, cooling, ignition, induction and exhaust systems, tanks, pipe lines, engine controls, airscrew complete with hub, together with characteristic defects.
3. The inspection, adjustment and testing of the power plant and its accessories to ensure correct functioning and power output after installation in the aircraft and during daily maintenance, including airscrews, magnetos, Carburettors, pumps, filters, engine starters and starting mechanisms and the parts or components on whose condition the correct functioning of the power plant depends;
4. causes, effect, and prevention of external and internal corrosion.
5. The correct grades of oil and the lubricants approved by the engine manufacturer for use on the particular engine or engines and their seasonal application; periods of running between oil changing.
6. The minimum requirements for the fuel as specified or recommended by the engine manufacturer.
7. The methods of inspecting and testing the installation of the instruments connected with the power plant concerned to ensure correct functioning, including pressure gauges, temperature and revolution indicators, boost gauges and tank contents gauges.
8. The method or methods of starting engines in sub-zero temperatures, including precautions to be taken to minimize the risk of fire, when naked flames are used during this operation.
9. For certificate to include supercharged engines, the functioning of superchargers and boost control.
10. For certificate to include Compression Ignition Engines; the fuel injection system and method of regulation.
11. All applicable modifications contained in Technical Information Circulars issued by the Controller of Civil Aviation.

12. The entries which must be made in the appropriate log book, and ability to select data for and to make the suitable entries to provide a useful history of the engine.
13. Air Regulations in so far as they affect Air Engineers.

(d) **Category "D": Inspection of Aero Engines after complete overhaul**

The applicant must be familiar with the general principles of the inspection of aero engines during construction and/or complete overhaul including knowledge of-

1. **Materials :**

- a. Materials used in engine construction and their relative specifications,
- b. methods of identification, re-examination and testing.
- c. Characteristic defects which render them unsuitable and
- d. precautions to be observed during processes of manufacture and repair: heat treatment, white metalling, etching, brazing, soldering,
- e. protection against corrosion, etc.-to ensure that the finished parts are in a satisfactory condition.

2. **testing and measurement**

- a. The general principles of testing and measurement of horse power, fuel and oil consumption, etc., as applied to aero engines.
3. The correct grades of oil and the lubricants approved by the engine manufacturer for use on the particular engine or engines and their seasonal application; periods of running between "oil changing";
4. characteristic defects resulting from incorrect or insufficient lubrication;
5. cause and effect of sludge formation.
6. The minimum requirements for the fuel as specified or recommended by the engine manufacturer.
7. The general assembly, adjustment and methods of testing the correct erection of the components of the particular type or types of aero engine for which the certificate is required~ including the safe allowances for deterioration, wear, distortion, balancing of parts, etc.
8. The methods of adjustment, repair and testing of carburetors, engine starters, pumps, etc., that are fitted to the particular type of engine .and of minor repairs to, .and adjustment of, magnetos.
9. Causes, effects and prevention of external and internal corrosion.
10. Protection against corrosion during storage.
11. The methods of inspecting and checking the correct functioning of the ignition, carburation, lubrication and cooling systems on the engine during tuning up and testing.
12. For certificates to include supercharged engines, the method of construction, testing and functioning of the supercharger unit and its accessories.
13. For certificates to include Compression Ignition Engines, the construction of the Fuel Injection System and the methods of fuel regulation.
14. All applicable modifications contained in Technical Information Circulars issued by the Controller of Civil Aviation.
15. Entries which must be made in the appropriate log book, and ability to select data for and to make the suitable entries to provide a useful history of the engine.
16. Air Regulations in so far as they affect Air Engineers.

**q) PRACTICAL TEST – Air Mechanics - ALL Categories**

(a) *Tools and Materials:*

- a) An Air Engineer in the performance of his duties may and often will be required to execute various repairs and replacements, for which a certain amount of skill in the manipulation of materials and the use of hand tools is necessary.
- b) Candidates must satisfy the examiner that they possess the required skill for this work and may be required to demonstrate this fact by actual tests. These tests will be confined to simple operations as:-
- a. Use of files and scrapers.
  - b. Use of measuring instruments.
  - c. Marking off and drilling, to drawing.
  - d. Bending of sheet metal and tube.
  - e. Soldering and brazing.
  - f. Use of carpenter's hand tools.
  - g. Preparation and use of casein cement.
  - h. Sewing of fabric
  - i. Splicing of control cables.
  - j. Riveting.
  - k. Fitting of Piston Rings.
  - l. Valve grinding, etc.

**r) Air Engineer Qualifying Examinations - Theoretical**

**(a) Category "A" : Daily Inspection of Aircraft / airframes before flight**

Applicants must be familiar with the general principles of the systematic maintenance and examination of aircraft before flight, including knowledge of:-

8. The method of checking the correct assembly of components, the rigging of an erected aircraft and the functioning of the flying controls, together with the correction of faults experienced during flight, the assembly and functioning of the landing gear including the correct rigging of skis, and the method of erection, truing up and maintenance of hulls and floats of wood, metal, or composite construction.
9. The defects and deterioration in wing coverings, timber and metal members, metal fittings, airscrews (wood or metal), streamline wires, tie-rods, cables, shock absorbing devices and the parts of the aircraft structure that may be expected to occur as the result of wear and tear, or may be produced by slight mishaps experienced during normal operations of the aircraft, and a knowledge of the method of effecting minor repairs and replacements.
10. The method of inspecting and testing the installation of the flying instruments to ensure correct functioning.
11. Compass adjustment, turn indicator, and electrical services, the method of inspecting and testing of the installation concerned in order to ensure correct functioning.
12. All applicable modifications contained in Technical Information Circulars issued by the Controller of Civil Aviation.
13. The entries which must be made in the appropriate log book, and ability to select data and to make the suitable entries to provide a useful history of the aircraft.
14. Air Regulations in so far as they affect Air Engineers.

**(b) Category "B"- Inspection of Aircraft/ airframes after Overhaul, Major Repair, Major Modification.**

The applicant must be familiar with the general principles of the inspection of aircraft construction. including knowledge of:-

11. Non-Metallic materials and their relative specifications;
12. methods of identification, examination and testing;
13. characteristic defects which render them unsuitable and precautions to be observed in their application to aircraft construction.
14. Metallic materials and their relative specifications, methods of identification, examination and testing; characteristic defects which render them unsuitable and precautions to be observed during processes of manufacture or repair-(heat treatment, welding, brazing, soldering, plating, etc.).
15. The method of construction and examination of hulls and floats; effects of corrosion, causes of corrosion and protection against corrosion.
16. The method of construction, examination and testing of aircraft parts and components-(fuselages, wings, airscrews, tanks, radiators, pumps, cocks, etc.) corrosion and its prevention. The high tensile steels, strong aluminum alloys, etc., and the special workshop processes applicable to the materials used in the particular construction or constructions.

17. Method of inspecting and testing the complete aircraft for correct assembly, installation of engine, controls, fuel, oil and water systems, cabin heaters, instruments, electrical services and the appliances.
18. All applicable modifications contained in Technical Information Circulars issued by the Controller of Civil Aviation.
19. The entries which must be made in the appropriate log book, and ability to select data and to make the suitable entries to provide a useful history of the aircraft.
20. Air Regulations in so far as they affect Air Engineers.

(c) **Category "C": Daily Inspection of Aero Engines before flight**

The applicant must be familiar with the general principles of inspection and testing of aero engine installation and maintenance, including knowledge of:

14. The general construction of the particular type or types of engine for which the Certificate is required, together with the running time permissible before overhaul; the method and details of making a partial overhaul for the purpose of carbon removal, valve grinding and inspection, the defects likely to be encountered and the permissible allowances for wear and distortion; the methods of inspection and testing during and after this operation to ensure correct assembly and functioning.
15. The methods of examining and testing the correct erection of the power plant and its accessories in the aircraft, including the fuel, oil, cooling, ignition, induction and exhaust systems, tanks, pipe lines, engine controls, airscrew complete with hub, together with characteristic defects.
16. The inspection, adjustment and testing of the power plant and its accessories to ensure correct functioning and power output after installation in the aircraft and during daily maintenance, including airscrews, magnetos, Carburettors, pumps, filters, engine starters and starting mechanisms and the parts or components on whose condition the correct functioning of the power plant depends;
17. causes, effect, and prevention of external and internal corrosion.
18. The correct grades of oil and the lubricants approved by the engine manufacturer for use on the particular engine or engines and their seasonal application; periods of running between oil changing.
19. The minimum requirements for the fuel as specified or recommended by the engine manufacturer.
20. The methods of inspecting and testing the installation of the instruments connected with the power plant concerned to ensure correct functioning, including pressure gauges, temperature and revolution indicators, boost gauges and tank contents gauges.
21. The method or methods of starting engines in sub-zero temperatures, including precautions to be taken to minimize the risk of fire, when naked flames are used during this operation.
22. For certificate to include supercharged engines, the functioning of superchargers and boost control.
23. For certificate to include Compression Ignition Engines; the fuel injection system and method of regulation.
24. All applicable modifications contained in Technical Information Circulars issued by the Controller of Civil Aviation.



25. The entries which must be made in the appropriate log book, and ability to select data for and to make the suitable entries to provide a useful history of the engine.
26. Air Regulations in so far as they affect Air Engineers.

(d) **Category "D" : Inspection of Aero Engines after complete overhaul**

The applicant must be familiar with the general principles of the inspection of aero engines during construction and/or complete overhaul including knowledge of:

**17. Materials :**

- a. Materials used in engine construction and their relative specifications,
- b. methods of identification, re-examination and testing.
- c. Characteristic defects which render them unsuitable and
- d. precautions to be observed during processes of manufacture and repair: heat treatment, white metalling, etching, brazing, soldering,
- e. protection against corrosion, etc.-to ensure that the finished parts are in a satisfactory condition.

**18. testing and measurement**

- a. The general principles of testing and measurement of horse power, fuel and oil consumption, etc., as applied to aero engines.
19. The correct grades of oil and the lubricants approved by the engine manufacturer for use on the particular engine or engines and their seasonal application;
20. periods of running between "oil changing";
21. characteristic defects resulting from incorrect or insufficient lubrication;
22. cause and effect of sludge formation.
23. The minimum requirements for the fuel as specified or recommended by the engine manufacturer.
24. The general assembly, adjustment and methods of testing the correct erection of the components of the particular type or types of aero engine for which the certificate is required~ including the safe allowances for deterioration, wear, distortion, balancing of parts, etc.
25. The methods of adjustment, repair and testing of carburetors, engine starters, pumps, etc., that are fitted to the particular type of engine .and of minor repairs to, .and adjustment of, magnetos.
26. Causes, effects and prevention of external and internal corrosion.
27. Protection against corrosion during storage.
28. The methods of inspecting and checking the correct functioning of the ignition, carburation, lubrication and cooling systems on the engine during tuning up and testing.
29. For certificates to include supercharged engines, the method of construction, testing and functioning of the supercharger unit and its accessories.
30. For certificates to include Compression Ignition Engines, the construction of the Fuel Injection System and the methods of fuel regulation.
31. All applicable modifications contained in Technical Information Circulars issued by the Controller of Civil Aviation.
32. Entries which must be made in the appropriate log book, and ability to select data for and to make the suitable entries to provide a useful history of the engine.
33. Air Regulations in so far as they affect Air Engineers.

## **PRACTICAL TESTS – Air Engineers - ALL Categories**

### ***Use of Tools and Materials:***

An Air Engineer in the performance of their duties may, and often will, be required to execute various repairs and replacements themselves, for which a certain amount of skill in the manipulation of materials and the use of hand tools is necessary. Candidate Air Engineers must satisfy the examiner that they possess the required skill for this work and may be required to demonstrate their abilities by actual tests. These tests may or may not be confined to simple operations such as:

- a. Use of files and scrapers.
- b. Use of measuring instruments.
- c. Marking off and drilling, to the design drawing specification.
- d. Bending of sheet metal and tube.
- e. Soldering and brazing.
- f. Use of carpenter's hand tools.
- g. Preparation and use of casein cement.
- h. Sewing of fabric
- i. Splicing of control cables.
- j. Riveting.
- k. Fitting of Piston Rings.
- l. Valve grinding, etc.

**Authority of the Air Engineers' License**  
**Air Engineer Category "A"**

*Air Engineer's Certificate, Category "A"* authorizes the holder, after personally accomplishing an adequate inspection, to "certify as airworthy":

1. any of the types of aircraft endorsed on his certificate, provided:
  - a) That the annual Certificate of Airworthiness for the particular aircraft is in good standing.
  - b) That they are satisfied that the aircraft is airworthy at the time they record this fact in the aircraft log book.
2. any minor repairs and replacements which become necessary to these types of aircraft as the result of normal use.

**NOTE of Caution:**

"Minor repairs and replacements" are defined as:

"those repairs and replacements which do not affect the strength of the main structural members of the aircraft, **except that** these main structural members may be replaced only by replacing the complete assembly in which they may occur" - in which case the repair / replacement of the assembly must have been duly certified as airworthy by an air engineer holding the appropriate certificate (i.e "B" for Airframe, "D" for Engine).

A spar is a main structural member and forms an integral part of a main assembly. The repair or replacement of a spar must be certified by an air engineer licensed in Category "B."

A longeron forms an integral part of the fuselage and the same rule applies to replacement of these components and their certification by an air engineer licensed in Category "B."

An air engineer, Category "A," may certify the aircraft as airworthy after the satisfactory replacement of the now certified complete assembly containing either a Spar or Longeron.

**Air Engineer Category "B"**

An Air Engineer, Category "B," is authorized to "certify as airworthy", after major repair or complete overhaul, any of the aircraft endorsed on his Certificate provided:

1. That the aircraft conforms to the type for which the original Certificate of Airworthiness was issued, with the exception of such modifications as may have been ordered by the Minister in Technical Information Circulars issued by the Controller of Civil Aviation or otherwise approved.
2. That they are satisfied by adequate and personal inspection that:
  - a. the strength of the repaired component or components is similar to the strength of the same components when in the new state, and
  - b. that such repaired components or replacements conform to the approved drawings in material and dimensions, except:
    - i. That damaged portions of welded steel tube fuselages and of the components of similar construction may be replaced provided that the location and design of the welds conform to established practice for the type of repair, and,
    - ii. That the original metallurgical structure of the material has been restored by suitable heat treatment in those components on which heat treatment is a requirement during manufacture, and
    - iii. That repairs to the forms of construction are similarly in accordance with established practice, and

- iv. That repairs to spars and the components as may be specifically directed by Technical Information Circulars conform to sketches or drawings which have been submitted to the Minister and approved by the Minister for each repair.
- 3. That they are satisfied by adequate and personal inspection that:
  - a. the aircraft has been assembled correctly including the installation or insertion of all necessary locking devices required to prevent the accidental separation of any of the components, and
  - b. that the method of protection used against deterioration is reasonable for the purpose, bearing in mind the particular conditions under which the aircraft is required or expected to operate.

### **Air Engineer Category "C"**

*Air Engineers licensed in Category "C"* are authorized to

1. certify as airworthy any of the types of aircraft engines endorsed in their License provided:
  - a. That no modifications to such engines have been made, except:
    - i. as directed by the Minister in Technical Information Circulars, or
    - ii. unless otherwise approved.
  - b. That they are satisfied by adequate personal inspection that the engine is airworthy at the time they record this fact in the appropriate log book.
2. In addition, an *Air Engineers licensed in Category "C"* authorizes the holder, after adequate personal inspection, to certify as airworthy all:
  - a. minor repairs,
  - b. minor replacements and
  - c. minor adjustmentswhich may be required to the engine:
  - i. as a result of normal operation, or
  - ii. which become apparent during partial overhaul.

Partial overhaul is defined as:

- a) Removal of cylinders and attached valve gears for the purpose of carbon removal,
- b) valve reseating,
- c) general inspection not requiring the complete dismantling of the engine.
- d) Removal of accessory units for examination, adjustment or repair.

### **Air Engineer Category "D"**

*An Air Engineer licensed in Category "D"* is authorized to:

1. certify as airworthy, after major repairs and/or complete overhaul any engines of the types endorsed on his certificate, provided:
  - a. That replacement parts conform in all respects to the manufacturer's approved drawings for such parts.
  - b. That reasonable precautions against failure of any part has been taken by means of adequate inspection.
  - c. That no modifications have been made or added except as ordered by the Minister in Technical Information Circulars, or otherwise approved by him.
  - d. That they are satisfied by adequate and personal inspection, that the engine has been correctly assembled including the installation or insertion of all necessary locking

- devices as will prevent the accidental separation or derangement of any of the components.
- e. That the satisfactory functioning of the assembled engine and its essential accessories has been proved by adequate ground test.
- f. That the protection against deterioration is reasonable having in mind the particular conditions under which the engine is required or expected to operate.

This list of "Authorizations" does not imply that all repairs to aircraft or engine must be accomplished by an Air Engineer. It is permissible for the actual work required for preparing an aircraft or engine for certification to be carried out by a suitably certified competent mechanic, except the result of the mechanic's work must be certified by an Air Engineer holding a License in the appropriate category, before the aircraft can be accepted as airworthy.

ALL Licensed Air Engineers' are entrusted to mentor/ guide / coach certificated Air Mechanics wishing to become Licensed Air Engineers (henceforth known as "Apprentice Air Engineer" or "Candidate Air Engineer") to ensure the person knowingly and willingly serves an apprenticeship as a junior Inspector / Certifier while learning to understand the role and responsibility of the Licensed Air Engineer and ultimately performing the same Government Administrative tasks as a Licensed Air Engineer in order to be deemed competent to undertake their Federal Government tests to be issued an Air Engineer's License.

#### **PERIOD OF VALIDITY**

##### **a) Air Mechanic Certificates Of Competency:**

- a) are issued for a period of ten (10) years.
- b) **Are kept valid by the Provincial Trades Board thru periodic**
  - a. information updates,
  - b. trades-show attendance,
  - c. Skill development sessions

##### **b) Air Engineer Licenses**

- a) are issued for a period of three (3) years.
- b) **Are kept valid by the Federal Government thru periodic**
  - a. information updates,
  - b. Professional Development seminar attendance,
  - c. Skill development sessions

#### **RENEWALS**

##### **c) of Air Mechanic Certificates Of Competency:**

- a) Applicants for renewal / update / etc of Air Mechanic Certificates of Competency ....PLACEHOLDER

##### **d) of Air Engineer Licenses**

- a) Applicants for renewal of **Air Engineer License** must produce proof to the examining official that:
  - a. they are in possession of a copy of all current Technical Information Circulars, and
  - b. that they are familiar with the material within them.
- b) Technical Circulars bear a serialized number prefixed by the letter "T" thus T/12, T /17, T/34, etc.

- c) Missing current Technical Information Circulars may be obtained from the Department of Transport on request.
- d) Applicants must state the serial number of the last Technical Information Circular received by them.
- e) **Air Engineer Licenses** are normally renewed for a period of three years.